

Solve the following equations and inequalities for x.

1) $14^x = 753$

$$\log_{14} 753 = x$$

$$x = 2.51$$

2) $7 + x^5 = 84$

$$\sqrt[5]{x^5} = \sqrt[5]{77}$$

$$x = 2.38$$

3) $3(8)^{x-3} = 99$

$$8^{x-3} = 33$$

$$\log_8 33 = x-3$$

$$1.68 = x-3$$

$$x = 4.68$$

4) $\log_7 83.5 = x$

$$x = 2.27$$

5) $\log_x 83 = 5$

$$\sqrt[5]{x^5} = \sqrt[5]{83}$$

$$x = 2.42$$

6) $5 = \log_3 (2x)$

$$3^5 = 2x$$

$$243 = 2x$$

$$x = 121.5$$

Simplify

7) $\frac{5x-1}{x^2+10x+21} + \frac{8}{x+7} \cdot \frac{(x+3)}{(x+3)}$

$$\frac{5x-1+8x+24}{(x+7)(x+3)} \sim \frac{13x+23}{(x+7)(x+3)}$$

8) $\frac{x^2+8}{x+5} + \frac{7x+2}{x+5}$

$$\frac{x^2+7x+10}{x+5} \sim \frac{(x+5)(x+2)}{(x+5)}$$

$$x+2$$

Solve each equation.

9) $\frac{3(4x)}{5} + \frac{x-2}{3} = \frac{5}{5}x$

$$\frac{12x}{15} + \frac{5x-10}{15} = \frac{15x}{15}$$

$$12x+5x-10=15x$$

$$17x-10=15x$$

$$2x=10$$

$$x=5$$

10) $\frac{8}{x} = \frac{x-3}{5}$

$$8(5) = x(x-3)$$

$$40 = x^2 - 3x$$

$$0 = x^2 - 3x - 40$$

$$0 = (x-8)(x+5)$$

$$x=8$$

$$x=-5$$

Applications.

The population of Marshall County in n years can be predicted by using the equation: $P = 48,000(1.02)^n$.

11) What will the population be in 5 years?

$$48000(1.02)^5$$

$$52,996 \text{ people}$$

12) How long will it take for the population of Marshall County to reach 60,000?

$$\frac{60000}{48000} = \frac{48000(1.02)^x}{48000}$$

$$1.25 = (1.02)^x$$

$$11.3 \text{ years}$$

$$\frac{\log 1.25}{\log 1.02}$$

13) A new television costs \$1,200. It will decrease in value 1% per month. Show work.

a) What will it be worth in 8 months?

$$\underline{\$1107.29}$$

$$y = 1200(1-.01)^8$$

b) When will the TV be worth \$750.00?

(round your answer to 2 decimal places)

$$\frac{750}{1200} = \frac{1200(.99)^x}{1200}$$

$$.625 = (.99)^x$$

$$46.76 \text{ months}$$

$$\frac{\log .625}{\log .99}$$

Chapter 8

Convert the following angles to radians / degrees. Exact Values.

1) $70^\circ \cdot \frac{\pi}{180} = \frac{7\pi}{18}$ 2) $45^\circ \cdot \frac{\pi}{180} = \frac{\pi}{4}$ 3) $\frac{3\pi}{4} \cdot \frac{180}{\pi} = 135^\circ$ 4) $\frac{\pi}{2} \cdot \frac{180}{\pi} = 90^\circ$

Without using a calculator, give the exact value of each expression. **Unit Circle*

5) $\tan 60^\circ$ *$(\frac{1}{2}, \sqrt{3}/2)$*
 $\frac{\sqrt{3}/2}{1/2} = \sqrt{3}$
 6) $\cos 150^\circ$ *$(-\sqrt{3}/2, 1/2)$*
 $-\frac{\sqrt{3}}{2}$
 7) $\sin \frac{5\pi}{6}$ *$(-\frac{\sqrt{3}}{2}, 1/2)$*
 $1/2$
 8) $\sin \frac{\pi}{4}$ *$(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$*
 $\frac{\sqrt{2}}{2}$

Give the reference angle of each of the following.

9) 352° *$360 - 352 = 8^\circ$*
 10) 160° *$180 - 160 = 20^\circ$*
 11) -230° *$360 - 230 = 130$
 $180 - 130 = 50^\circ$*

Give the amplitude, period, horizontal shift, and vertical shift of each of the following. DO NOT GRAPH.

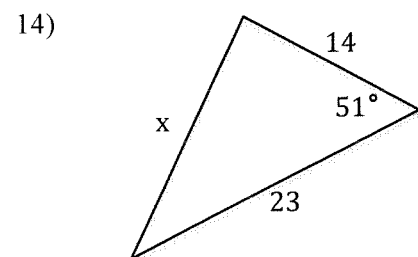
12) $y = 7 + 5 \cos 2(x - \frac{\pi}{4})$

Amplitude 5
 Period $\frac{2\pi}{2} = \pi$
 Horizontal shift $\pi/4$ right
 Vertical shift 7 up

13) $y = 9 + \sin 7(x + \frac{5\pi}{6})$

Amplitude 1
 Period $\frac{2\pi}{7}$
 Horizontal shift $-\pi/6$ left
 Vertical shift 9 up

Find the value of x in each of the following triangles. If needed use: $a^2 = b^2 + c^2 - 2bc \cos A$



$x = 17.88$

$x^2 = 14^2 + 23^2 - 2(14)(23)\cos(51)$
 $\sqrt{x^2} = \sqrt{319.71}$

Solve the following equations.

16) $\log_7(x - 4) = 2$

$7^2 = x - 4$
 $49 = x - 4$
 $53 = x$

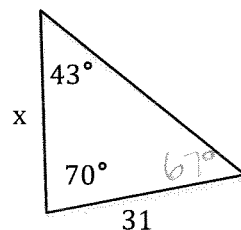
17) $7 + (x + 5)^2 = 43$

$\sqrt{(x+5)^2} = \sqrt{36}$
 $x + 5 = 6$
 $x = 1$ or $x = -11$

18) $7^{x-3} = 145$

$\log_7 145 = x - 3$

15)



$x = 41.84$

$180 - 113 = 67^\circ$
 $\frac{\sin(43)}{31} = \frac{\sin(67)}{x}$